

REMARKS

I. Status Summary

Claims 1-12 are pending in the present application. Claims 1-12 have been examined by the U.S. Patent and Trademark Office (hereinafter "the Patent Office") and currently stands rejected. In addition, the Patent Office has objected to claim 4.

Claims 1, 3, 4, 10, and 11 have been amended. New claim 13 has been added. Support for the amendments and new claim can be found throughout the specification and claims as originally filed. No new matter has been added.

Reconsideration of the application in view of the amendments and the remarks set forth herein below is respectfully requested.

II. Response to Objections

The Patent Office has objected to claim 4. The Patent Office contends that claim 4 should recite "clusters are" instead of "clusters is" for grammatical reasons.

Applicants respectfully submit that claim 4 has been amended to recite "clusters are." Support for the amendment can be found in claim 4 as originally filed. Accordingly, applicants respectfully submit that the Patent Office's comments regarding claim 4 have been addressed. Therefore, applicants respectfully request that the instant objection be withdrawn. Further, applicants respectfully believe that claim 4 is in condition for allowance, and a Notice of Allowance to that effect is respectfully requested.

III. Response to Rejections under 35 U.S.C. § 112, Second Paragraph

Claims 3 and 11 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. More particularly, the Patent Office contends that claim 3 is indefinite because the term "the aromatic groups" lacks sufficient antecedent basis. The Patent Office contends that claim 11 is indefinite because the claim recites monomers A1 and B1, which are alleged to be optional in claim 10. Therefore, the Patent Office contends that A1 and B1 lack sufficient antecedent basis.

After careful review of the rejection and of the Patent Office's comments, applicants respectfully traverse the rejection and offer the following remarks.

Initially, applicants respectfully submit that claim 3 has been amended herein to recite “wherein the cross-linkable polymer contains a hydrophobic side chain containing an aromatic group.” Claim 3 has also been amended to recite “the aromatic group.” Support for the amendment can be found in claim 3 as originally filed and in the instant specification, for example, in paragraphs [0005] and [0014].

Claim 10 has been amended to include “(i)” and “(ii)” to further clarify the subject matter recited in the claim. Claim 10 has also been amended to recite “selected from the group consisting of B1) monomer, B2) monomer, and B3) monomer wherein the B1) monomer is”, as well as “the B2) monomer is” and “the B3) monomer is.” Support for the amendments can be found in claim 10 as originally filed. Additional support can be found, for example, in the instant specification at paragraph [0021], which recites a similar type of subheading (i.e., (A) and (B)) as the presently recited (i) and (ii).

Claim 11 has been amended to recite “wherein the cross-linkable polymer is a copolymer obtained by copolymerizing at least two types of monomers selected from B1) monomer, B2) monomer, and B3) monomer, wherein the B1) monomer is a monomer represented by chemical formula 1:”, “group represented by chemical formula 2:”, “or chemical formula 3:”, “the B2) monomer is a monomer represented by chemical formula 4:”, and “the B3) monomer is a monomer represented by chemical formula 5.” Support for the amendments can be found in claims 10 and 11 as originally filed.

Applicants respectfully submit that claims 3 and 11 as presented herein are believed to address the Patent Office’s comments. In particular, applicants respectfully submit that “the aromatic group” in claim 3 has sufficient antecedent support in the recitation “contains a hydrophobic side chain containing an aromatic group.” With regard to claim 11, applicants respectfully submit the explicit recitation of B1) monomer, B2) monomer and B3) monomer in the claim provides sufficient antecedent basis for the further description of all three monomers.

Thus, applicants respectfully believe that claims 3 and 11 meet the requirements of 35 U.S.C. § 112, second paragraph. Applicants respectfully request that the rejection of claims 3 and 11 under 35 U.S.C. § 112, second paragraph, be withdrawn and further request that claims 3 and 11 be allowed at this time.

IV. Response to Rejections under 35 U.S.C. § 102(b) over Akiyama

Claims 1-3 and 5-12 have been rejected under 35 U.S.C. § 102(b) over Akiyama et al. (*J. Am. Chem. Soc.*, 125, 3412-3413 (2003); hereinafter "Akiyama"). More particularly, the Patent Office contends that Akiyama discloses a polymer-supported metal cluster composition comprising a transition metal supported by a cross-linked polymer, said polymer being formed by cross-linking a cross-linkable polymer having both hydrophobic and hydrophilic side chains with cross-linkable functional groups thereon. The Patent Office further contends that, although Akiyama does not explicitly disclose that the transition metal is in cluster form, such would be thought reasonably implicit or inherent, since the metal is in ligand-free form.

After careful consideration of the rejection and of the Patent Office's comments, applicants respectfully traverse the rejection and offer the following remarks.

Initially, applicants respectfully submit that claim 1 has been amended to recite "wherein the cross-linkable polymer contains at least one hydrophobic side chain and at least one hydrophilic side chain, wherein at least one hydrophilic side chain has a cross-linkable functional group, and wherein each hydrophobic side chain is free of hydrophilic substituents and cross-linkable functional groups." Support for the amendment can be found in claim 1 as originally filed and in the instant specification, for example, in paragraph [0005], [0013], and [0014]. In particular, support for hydrophobic side chains being free of hydrophilic and reactive groups can be found in the last sentence of paragraph [0014]. Support that "reactive groups" as recited in paragraph [0014] are cross-linkable groups can be found, for example, in the instant specification in paragraph [0035], particularly at lines 11-12 on page 16.

Applicants respectfully submit that the presently disclosed and claimed subject matter relates to compositions prepared from polymers comprising hydrophilic and hydrophobic side chains wherein at least one hydrophilic side chain includes a cross-linkable group and wherein each hydrophobic side chain is free of any hydrophilic and/or cross-linkable groups. An exemplary polymer (i.e., Polymer 1) of the instantly claimed subject matter is described, for example, in paragraphs [0040]-[0041] of the instant specification. Polymer 1 includes tetraethylene glycol and an epoxy-substituted

alkoxy group as hydrophilic side chains. The hydrophobic side chain of Polymer 1 is phenyl.

In contrast, in the polymers described in Akiyama, hydrophobic side chains can be substituted by hydrophilic and/or cross-linkable groups. See Akiyama, Figure 1, 1a-c. For example, the polymers of Akiyama include epoxy-substituted phenyl side chains.

Further, applicants respectfully submit that the same polymer designated as Polymer 1c in Figure 1 of Akiyama is also described as Polymer 2 in Comparative Example 1 of the instant application. See Instant Specification, paragraph [0070]. Heck reactions were catalyzed using palladium-containing compositions prepared from either Polymer 1 of the instantly disclosed subject matter (see Instant Specification, paragraph [0057]-[0058], Example 15) or Polymer 2 (i.e., the polymer of Akiyama). See Instant Specification, paragraph [0072]-[0074]. The compositions prepared from the polymer of Akiyama appear to contain incomplete micelles as evidenced by the finding that they leach metal. See Instant Specification, paragraphs [0073]-[0074]. The compositions prepared using the instantly recited polymers did not leach metal and also appeared to have superior catalytic activity. Id. Applicants respectfully submit that this comparative data provides further evidence that the polymers of instant claim 1 are different than those of Akiyama.

Thus, applicants respectfully submit that claim 1 has been distinguished from Akiyama. Each of claims 2, 3, and 5-12 depend from claim 1, and therefore include each and every element of claim 1. Accordingly, applicants respectfully submit that claims 2, 3, and 5-12 have also been distinguished from Akiyama.

Applicants respectfully request that the rejection of claims 1-3 and 5-12 under 35 U.S.C. § 102(b) over Akiyama be withdrawn. Applicants further respectfully request that claims 1-3 and 5-12 be allowed at this time.

V. Response to Rejections under 35 U.S.C. § 102(b)/103(a) over Akiyama

Claims 1-12 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as allegedly being unpatentable over Akiyama. The Patent Office concedes that Akiyama fails to explicitly teach metal cluster diameters of less than or equal to 20 nm, as recited in claim 4.

However, the Patent Office contends that such a diameter value would have been an inherent and/or obvious feature of the formed metal clusters since both the instantly claimed metal clusters and the metal clusters of Akiyama are alleged to be produced by identical or substantially similar processes.

Applicants respectfully traverse the rejection and offer the following remarks.

Initially, as described hereinabove, applicants respectfully submit that claim 1 has been amended to recite “wherein the cross-linkable polymer contains at least one hydrophobic side chain and at least one hydrophilic side chain, wherein at least one hydrophilic side chain has a cross-linkable functional group, and wherein each hydrophobic side chain is free of hydrophilic substituents and cross-linkable functional groups.” Support for the amendment can be found in claim 1 as originally filed and in the instant specification, for example, in paragraphs [0005], [0013], and [0014]. In particular, support for hydrophobic side chains being free of hydrophilic and reactive groups can be found in the last sentence of paragraph [0014]. Further support that “reactive groups” as recited in paragraph [0014] are cross-linkable groups can be found, for example, in the instant specification in paragraph [0035], particularly at lines 11-12 on page 16.

As also noted hereinabove, applicants respectfully submit that the presently disclosed and claimed subject matter relates to polymers comprising hydrophilic and hydrophobic side chains wherein at least one hydrophilic side chain includes a cross-linkable group and wherein the hydrophobic side chains are free of any hydrophilic and/or cross-linkable groups. In contrast, the polymers described in Akiyama include hydrophobic side chains that are substituted by hydrophilic and/or cross-linkable groups. See Akiyama, Figure 1, 1a-c. For example, the polymers of Akiyama include epoxy-substituted phenyl side chains. Accordingly, it is respectfully submitted that, regardless of the diameter of the micelles formed by supporting a transition metal with the polymer, the polymers of Akiyama and those of claim 1 are different.

Moreover, a comparative example described in the instant specification provides further evidence that the instantly claimed compositions and those of Akiyama are different. In particular, Heck reactions were catalyzed using palladium-containing compositions prepared from either Polymer 1 of the instantly disclosed subject matter

(see Instant Specification, paragraph [0057]-[0058], Example 15) or Polymer 2 (i.e., the polymer of Akiyama). See Instant Specification, paragraph [0072]-[0074]. As described in paragraphs [0073]-[0074] of the instant specification, the composition based on the polymer of Akiyama leached metal and provided a lower yield of reaction product than a composition of instant claim 1.

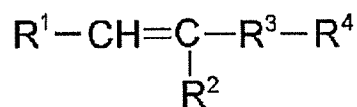
Thus, applicants respectfully submit that claim 1 has been distinguished from Akiyama. Applicants further respectfully submit that Akiyama neither teaches nor suggests the composition of claim 1. Each of claims 2-12 depend from claim 1, and therefore include each and every element of claim 1. Accordingly, applicants respectfully submit that Akiyama neither teaches nor suggests the subject matter recited in claims 2-12.

Applicants respectfully request that the rejection of claims 1-12 under 35 U.S.C. § 102(b) and/or 35 U.S.C. § 103(a) over Akiyama be withdrawn. Applicants further respectfully request that claims 1-12 be allowed at this time.

VI. New Claim

New claim 13 has been added.

New claim 13 recites the composition as in claim 10, wherein the cross-linkable polymer is a polymer or a copolymer obtained by polymerizing or copolymerizing at least one type of A1) monomer represented by chemical formula 1:



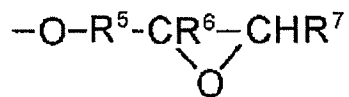
wherein R^1 is a hydrogen atom or an alkyl group having 1-6 carbon atom(s), R^2 is an aryl group having 6-14 carbon atoms, R^3 is a covalent bond, an alkylene group having 1-6 carbon atom(s), $-\text{R}^9(\text{OR}^{10})_m-$, $-\text{R}^9(\text{COOR}^{10})_n-$ or $\text{R}^9(\text{COOR}^{10})_o(\text{OR}^{10})_p-$,

wherein R^9 is independently a covalent bond or an alkylene group having 1-6 carbon atom(s), R^{10} is independently an alkylene group having 2-4 carbon atoms, m, n and p are integers of 1-10 and o is 1 or 2,

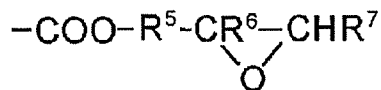
R^4 is a carboxyl group, an isocyanate group, an isothiocyanate group, a hydroxyl group, a primary or secondary amino group, a thiol group or a group represented by chemical

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formula 2:



or chemical formula 3:



wherein R⁵ is independently an alkylene group having 1-6 carbon atom(s), R⁶ and R⁷ are each independently a hydrogen atom or an alkyl group having 1-6 carbon atom(s), and R⁶ may form a 3-6 membered ring with R⁵ or R⁷.

Support for new claim 13 can be found in claims 10 and 11 as originally filed. No new matter has been added. Applicants respectfully submit that new claim 13 is believed to be patentable over the cited reference and in condition for allowance. Accordingly, applicants respectfully request a Notice of Allowance to that effect.

CONCLUSIONS

Should there be any minor issues outstanding in this matter the Examiner is respectfully requested to telephone the undersigned attorney. Early passage of the subject application to issue is earnestly solicited.

DEPOSIT ACCOUNT

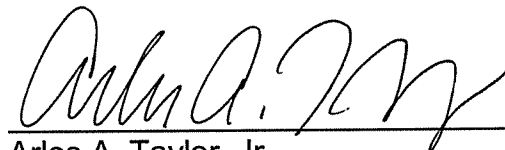
The Commissioner is hereby authorized to charge any other fees associated with the filing of this correspondence to Deposit Account Number 50-0426.

Respectfully submitted,

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